

# CLAIMS

What is claimed is:

1. A method for processing data sets, the method comprising:
  - (a) defining at least two primary region constraints in the data sets by creating a corresponding constraint data set;
  - (b) combining at least two primary region constraints using Boolean-logic expressions to define derived regions;
  - (c) creating mapping functions from Boolean-logic expressions of the derived regions;
  - (d) displaying desired derived regions through manipulation of the mapping functions.
2. The method of claim 1 wherein the primary region constraints are defined by creating constraint values, wherein the constraint values are sufficient to provide the space and structure to represent a desired number of derived regions.
3. The method of claim 1 wherein the data sets represents seismic data.
4. The method of claim 1 wherein the data sets represents seismic amplitude.
5. The method of claim 1 wherein the data sets represents a derivative value of seismic amplitude.
6. The method of claim 5 wherein the derivative value of seismic amplitude is discontinuity.
7. The method of claim 5 wherein the derivative value of seismic amplitude is curvature.
8. The method of claim 5 wherein the derivative value of seismic amplitude is facies.

9. The method of claim 1 wherein processing conditions are used as the mapping function.
10. The method of claim 1 wherein fuzzy constraints are used as the mapping functions.
11. The method of claim 1 wherein the data sets are three-dimensional data volumes.
12. The method of claim 1 wherein the method is computer implemented.
13. The method of claim 1 further comprising performing a data set rendering process, wherein the mapping function of step (c) is used for rendering a data set in the derived region.
14. The method of claim 13 further comprising volume sculpting and volume rendering wherein the mapping function of step (c) is used to render defined primary regions during volume sculpting and volume rendering.
15. The method of claim 13 further comprising processing of the data set during the rendering process.
16. A method for processing data sets, the method comprising:
  - (a) defining at least two primary region constraints in the data sets by creating corresponding constraint data set;
  - (b) combining at least two primary region constraints using Boolean-logic expressions to define derived regions;
  - (c) creating mapping functions from the Boolean-logic expressions of the derived regions;
  - (d) performing a data set rendering process, wherein the mapping function of step (c) is used in rendering a data set in the derived region;
  - (e) repeating step (d) until all displays of a derived regions that are desired to be rendered are rendered;

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(f) repeating steps (b) through (e) until all desired derived regions are created and rendered; and

(g) displaying desired derived regions.

17. The method of claim 16 wherein the method is computer implemented.

18. The method of claim 16 wherein the data sets are seismic amplitude data.

19. The method of claim 16 wherein the data sets represents a derivative value of seismic amplitude.

20. The method of claim 16 wherein the data sets are three-dimensional data sets.

21. The method of claim 16 further comprising processing of the data set during the rendering process of step (d).

22. The method of claim 16 wherein the displayed derived regions are further rendered after the derived regions are displayed.

23. The method of claim 16 wherein the mapping function of step (d) is used to create a texture memory transfer function and the data is rendered using the texture memory function.